DEPARTMENT OF HEALTH

Minnesota Perspective on PFAS

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Drinking Water Protection Section | Minnesota Department of Health

August 28, 2018

Overview

Topic

Background

Minnesota's PFAS Timeline

Heath-Based Values

Response

Lessons Learned

Minnesota Means Water

"Minnesota" is Dakota Sioux for "sky tinted water".

Minnesota has 90,000 miles of shoreline, more than California, Florida, and Hawaii combined.

Minnesota Agency Water Roles

Quality

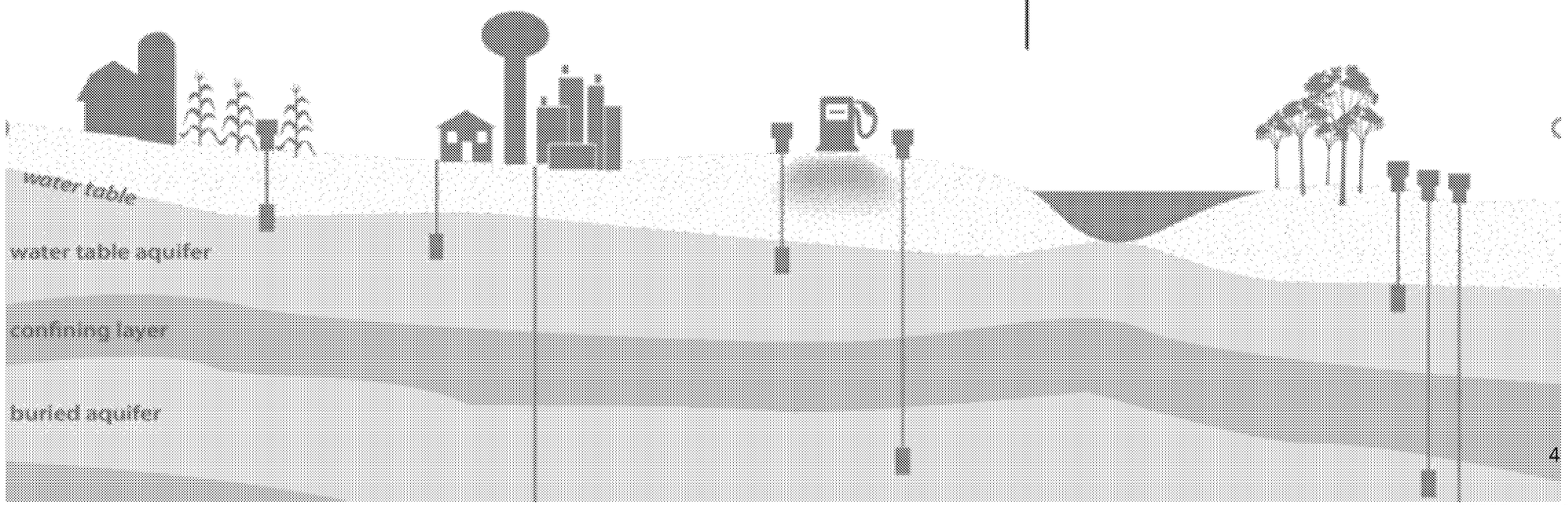
Quantity

MDA
Pesticides
Fertilizer

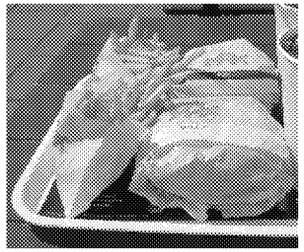
MDH
Public water supply
Well construction
Health risk assessment

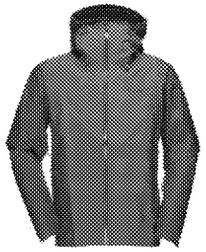
MPCA
Chemical releases
Industrial pollutants

DNR
Water supply/availability
Natural resource/ecosystem functions

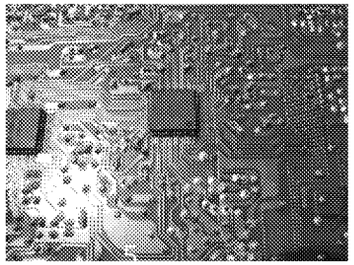


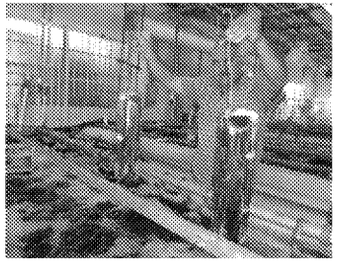
Per- and Polyfluoroalkyl Substances (PFAS)

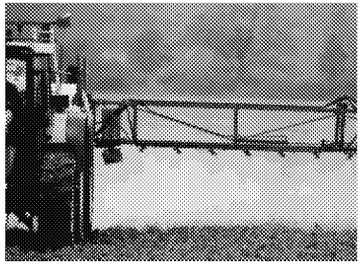


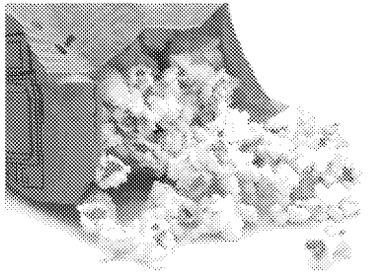


- Family of many synthetic chemicals
- Developed and used since the 1940s
  - resist heat, stains, water, oil, grease
  - “non-stick”
- Production increased rapidly in the 1970s
- Persist in the environment, found everywhere









Source: open access images – bing.com

Timeline of PFAS Activities in Minnesota

1950s – 1970s	• Disposal of PFAS occurred at sites in Washington County • No regulations at time of disposal
2000	• 3M began phase-out of PFOA/PFOS products
2002	• 3M informed State of MN of detections of PFOA/PFOS in production wells in Washington County • MDH releases first health-based guidance values

Timeline of PFAS Activities in Minnesota

2002 – 2004	• Groundwater monitoring revealed PFOA/PFOS contamination at additional sites
2007	• MPCA and 3M agree to consent order
2010	• MN Attorney General files natural resource damage lawsuit on behalf of state

Timeline of PFAS Activities in Minnesota

2014

- PFAS discovered at site in Bemidji, MN
  - UCMR3 monitoring
  - Source: firefighting foam (AFFF)

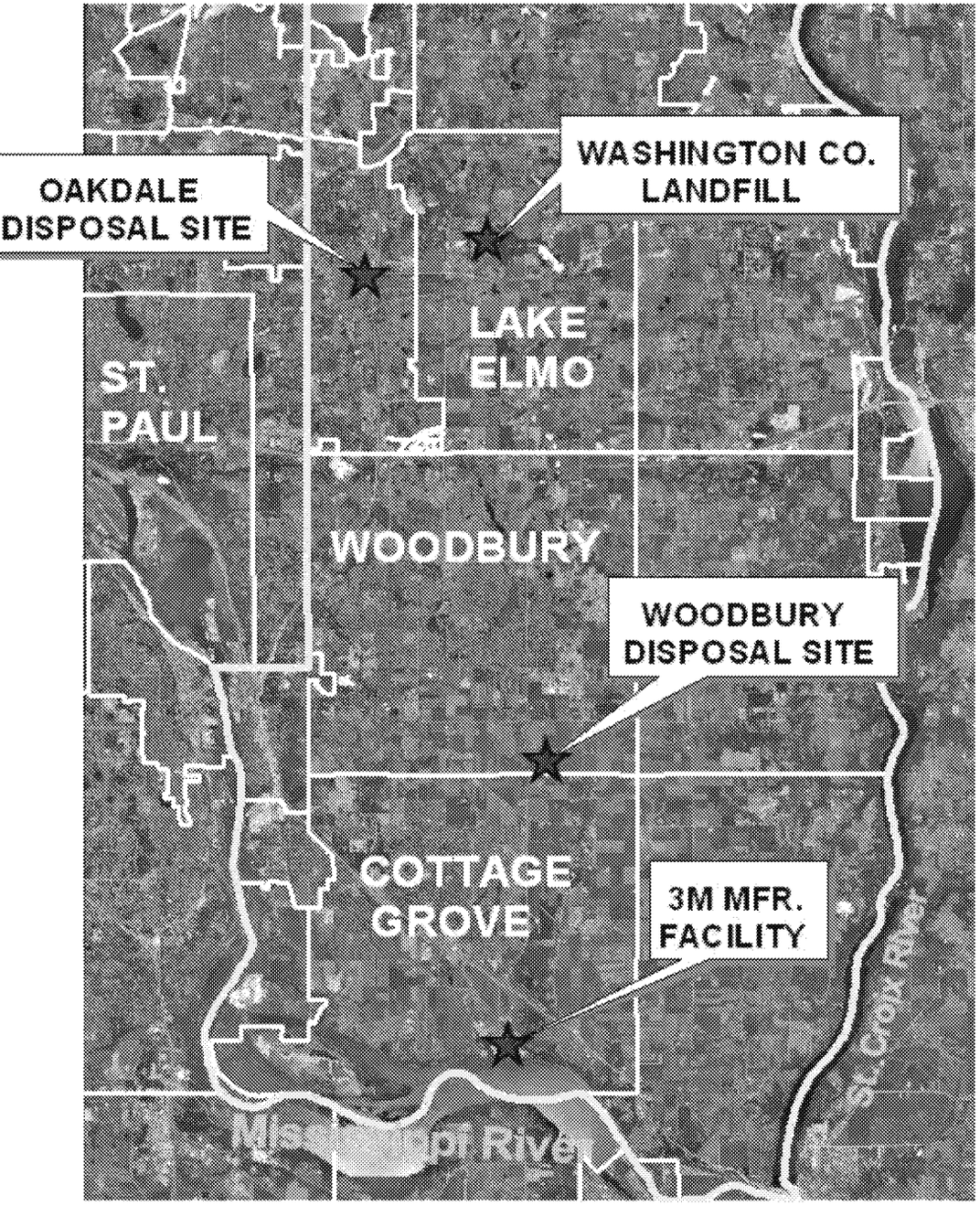
2018

- Settlement between 3M and State of Minnesota

2005 - present

- Public water system monitoring and treatment
- Private well monitoring and treatment

PFAS in Minnesota

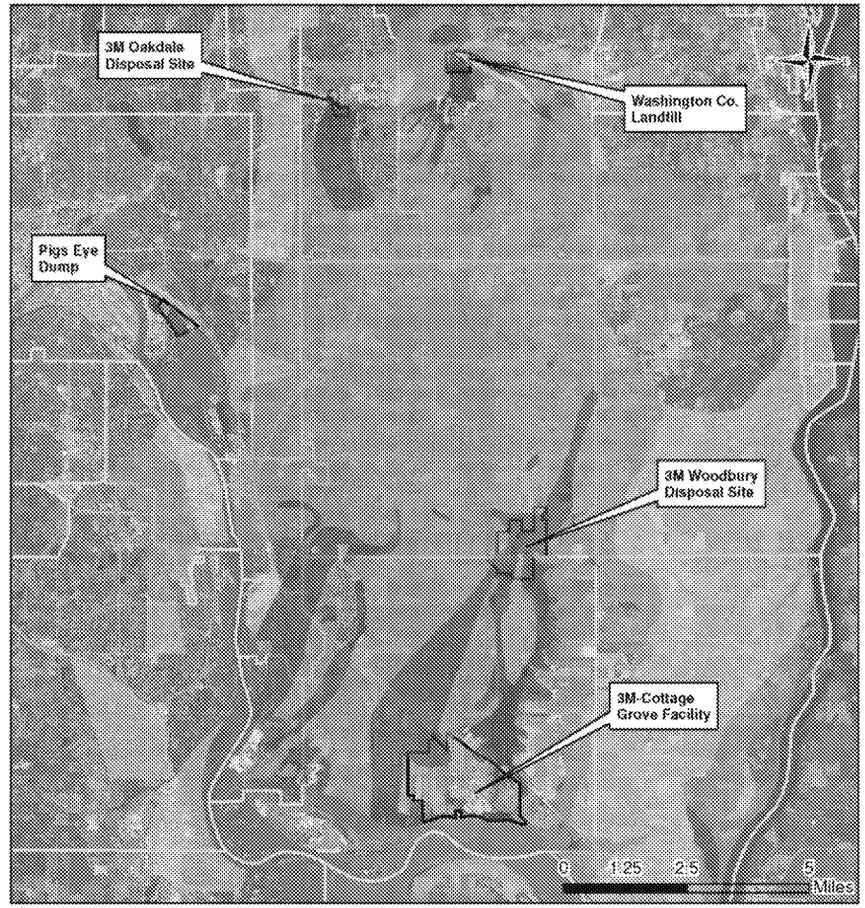


LOCATION OF 3M SITES IN WASHINGTON CO., MINNESOTA

- 4 PFAS disposal sites in Washington County
  - 3M made PFAS at its Cottage Grove facility in the early 1950s
  - PFOA was a primary product; some PFOS, PFBA and other PFAS
- Additional site in Bemidji
  - Firefighting foam

Extremely Large "Co-Mingled" Plumes

- Over 130 sq. mi. in Washington County
  - 4 major aquifers
  - 8 municipal systems & >1,800 private wells
  - Much larger than predicted by models
- PFBA most widespread
  - More PFBA in source areas
  - More mobile
- Movement of PFAS affected by several factors



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PFBA - All Aquifers

Phone: 651-201-4897
or 1-800-657-3908

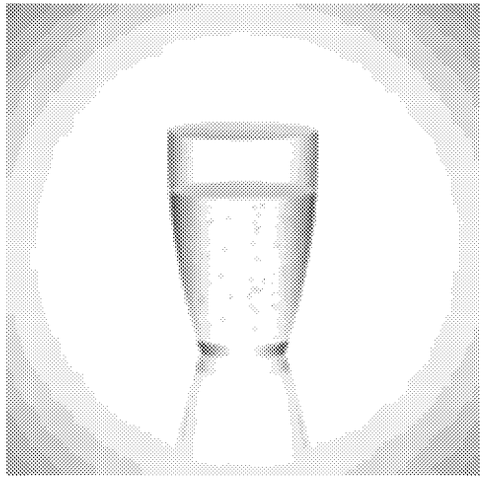
PFBA exceeds HRL (>70ppb)
PFBA exceeds HRL (7-70ppb)
PFBA 75-100% HRL (5.25-7ppb)
PFBA 50-75% HRL (3.5-5.25ppb)
PFBA 25-50% HRL (1.75-3.5ppb)
PFBA 10-25% HRL (0.7-1.75ppb)
PFBA <10% HRL (0.007-0.7ppb)
PFBA not detected
city

NOTES: Map combines data from all aquifers, actual concentrations in any area may vary; blank spaces indicate no sample data; PFBA HRL = 7 ppb

3/26/2018

MDH Health-Based Guidance Values

PFOS: 0.027 ppb	PFOA: 0.035 ppb
PFBA: 7 ppb	PFBS: 2/3 ppb



- The concentration of a chemical (or a mixture of chemicals) that is likely to pose little or no risk to human health
- Based on potential health impacts; do not consider cost and technology of prevention and/or treatment
- Non-regulatory
- Protective for susceptible & highly exposed populations
- Protective for tap water used for drinking, cooking, showering, and other uses
- Based on animal studies showing slight liver and thyroid effects (adults) and immune system and developmental effects (infants/children)

Health Risk Index

- MDH evaluates the combined effects of PFAS: Health Risk Index (HRI)
  - Allows us to account for differing levels of toxicity in similar chemicals
  - HRI > 1 indicates a possible health risk from given chemical group
- Cumulative – additivity assessment of chemicals with similar health endpoints (e.g. liver)

$$\frac{[\text{PFBA}]}{\text{PFBA HBG}} + \frac{[\text{PFBS}]}{\text{PFBS HBG}} + \frac{[\text{PFHxS}]}{\text{PFHxS HBG*}} + \frac{[\text{PFOA}]}{\text{PFOA HBG}} + \frac{[\text{PFOS}]}{\text{PFOS HBG}} = \text{Health Risk Index}$$

where [PFAS] = detected PFAS drinking water concentration in HBG units

*Currently using PFOS as an interim substitute

Risk Assessment and Water Guidance

PFAS	Health Endpoints
PFBA	Liver and thyroid
PFBS	Developmental, female reproductive system, kidney, and thyroid [blood system & liver no longer listed]
PFHxS	(see PFOS)
PFOA	Developmental, liver, immune system, and kidney
PFOS	Developmental, liver, immune system, and thyroid

	PFOA	PFOS	PFBA	PFBS	PFHxS
2002	7	1			
2006	1	0.6	1		
2007	0.5	0.3	7		
2009	0.3	0.3	7	7	
2013	0.3	0.3	7	7	0.3
2016	0.07	0.07	7	7	0.07
2017	0.035	0.027	7	3/2	0.027
2018-19		under review			under review

More information can be found at: *http://www.health.state.mn.us/divs/eh/risk/guidance/gw/table.html*

Response

DEPARTMENT OF HEALTH

MINNESOTA POLLUTION CONTROL AGENCY

DEPARTMENT OF NATURAL RESOURCES

Washington County | MN

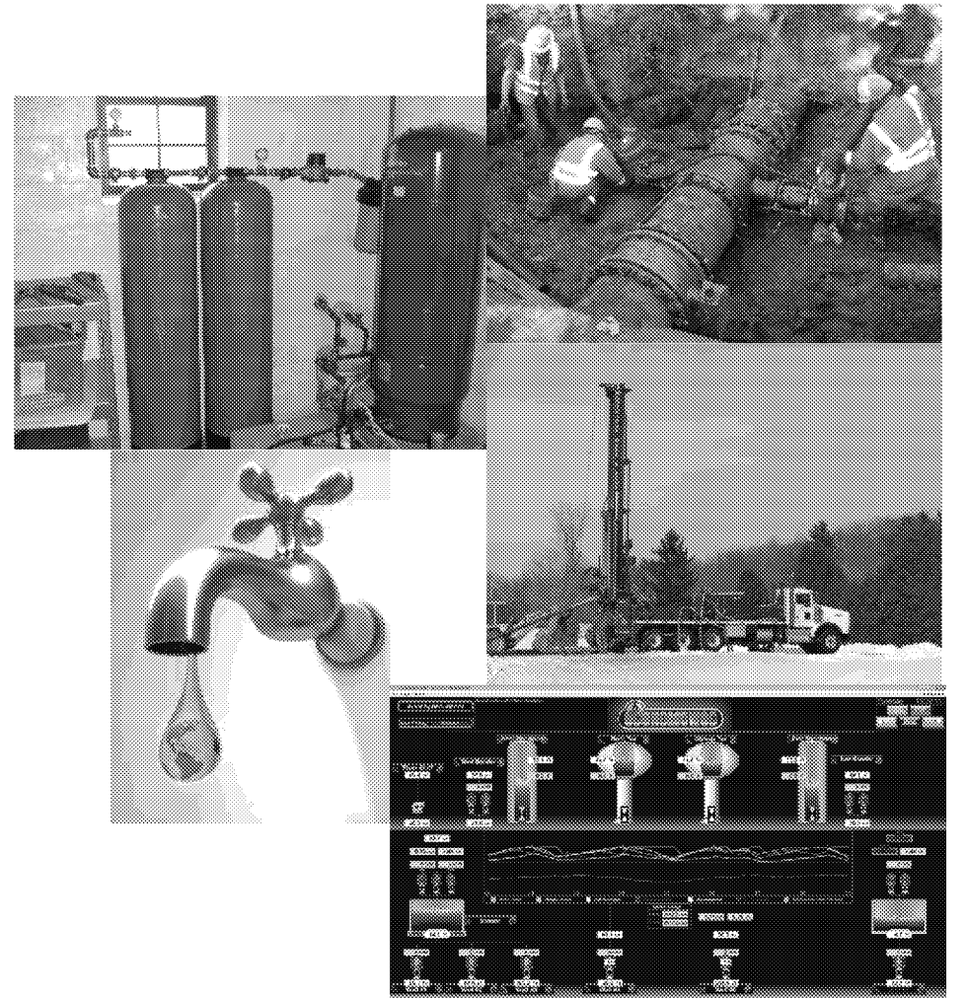
A great place to live, work, and play...today and tomorrow!

3M

Public water systems

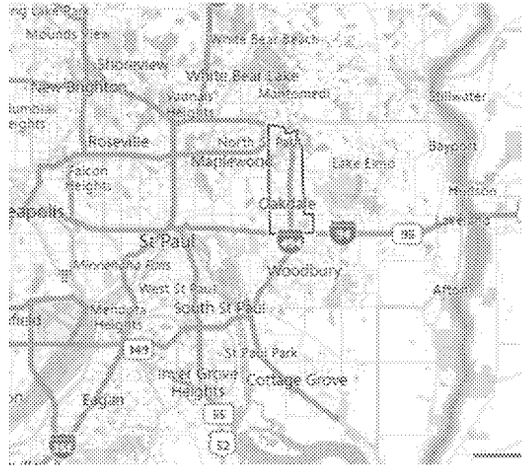
Response Options

- Regional interconnect
- New treatment facilities
- New wells
- Water conservation; limit use of contaminated wells
- Adapted blending scheme
- Others?



Oakdale (27,973)

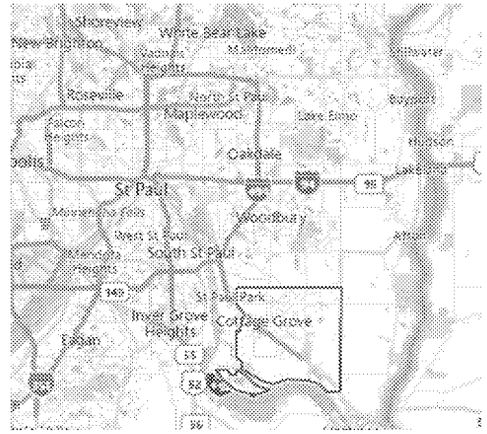
- 9 wells; PFAS exceeds MDH health-based guidance value in 7 wells
- PFAS concentrations
  - highest in the state for community systems
  - PFOA: 0.440 ppb maximum
  - PFOS: 0.610 ppb maximum
- Treatment (GAC) installed in 2006 for 2 wells; carbon replaced annually
- Primarily rely on 2 treated wells and 2 “clean” wells for water supply
- Video: http://bit.ly/2rWs9z5



CITY OF OAKDALE MINNESOTA

Cottage Grove (36,492)

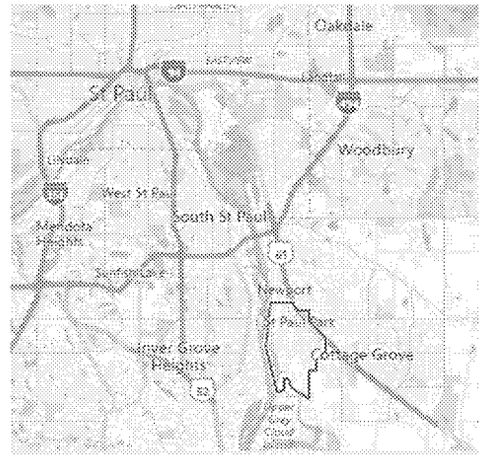
- 12 wells; PFAS exceeds MDH health-based guidance in 8 wells
- PFAS concentrations
  - PFOA: 0.066 ppb maximum
- Impacted when health-based guidance values lowered
- Installed GAC treatment on 2 wells in 2017
- Directly blend 7 wells to manage concentrations
- Temporary watering ban in 2017 after receiving health advisory letter from MDH and prior to treatment



Cottage Grove
Where Pride and Prosperity Meet

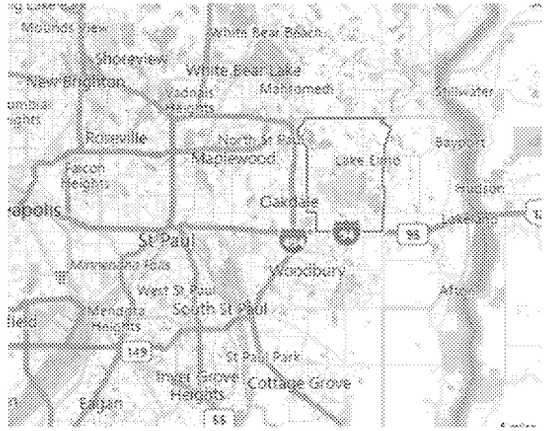
Saint Paul Park (5,519)

- 3 wells; PFAS exceeds MDH health-based guidance in 2 wells
- PFAS concentrations
  - PFOA: 0.043 ppb maximum
- Impacted when health-based guidance values lowered
- Want to install treatment on wells
- Managing pumping so clean well is used the most, and enforcing watering restrictions



Lake Elmo (4,878 / 8,069)

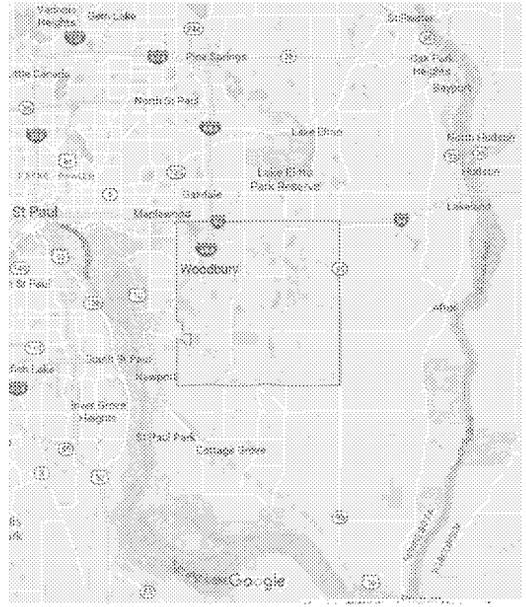
- Has 3 wells with 1 exceeding MDH health-based guidance values
- PFAS concentrations: no PFOS, 46 ppt PFOA
- Impacted when health-based guidance values lowered
- Many private wells in the city
- Options for new well limited by water quantity issues



THE CITY OF LAKE ELMO

Woodbury (69,245)

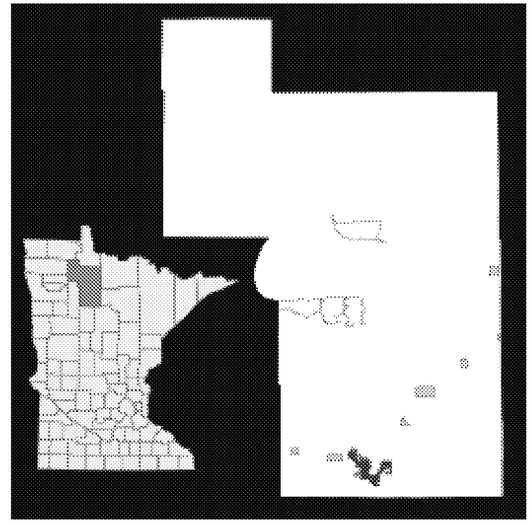
- 19 wells; PFAS exceeds MDH health-based guidance values in 5 wells
- PFAS concentrations
  - PFBA: 0.41 ppb maximum (all wells)
  - PFHxS: 0.07 ppb maximum (1 well)
  - PFOA: 0.049 ppb maximum (8 wells)
  - PFOS: 0.026 ppb maximum (3 wells)
- Primarily rely on wells that meet MDH health-based values for water supply. Others are used only seasonally to meet peak demand.



CITY OF Woodbury MINNESOTA

Bemidji (14,942)

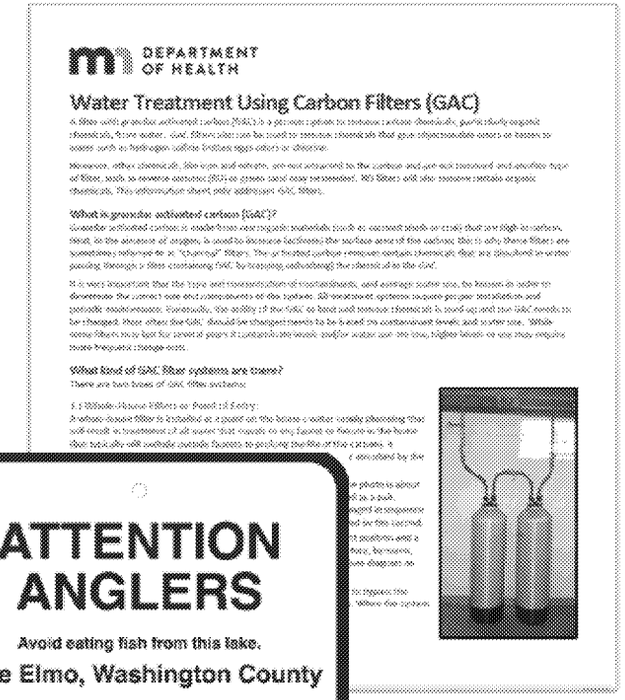
- 5 wells; PFAS exceeds MDH health-based guidance values in 4 wells
- PFAS concentrations
  - PFOS: 0.37 ppb maximum
  - PFHxS: 0.57 ppb maximum
- Source: firefighting foam – city responsible party
- PFAS discovered through UCMR3 monitoring
- All affected wells within city's airport and go to combined discharge – currently using 2 by blending
- Evaluating options – wells, treatment, new well field



Bemidji
First City On The Mississippi

Other PFAS Activities

- Private well sampling
  - >1,500 private wells sampled since 2003
  - >800 drinking water advisories issued
    - Homeowners provided in-home treatment funded by 3M
- Water filtration testing
  - GAC, RO, POU
- Fish consumption advice
  - Recommendations on how often to eat fish from certain waters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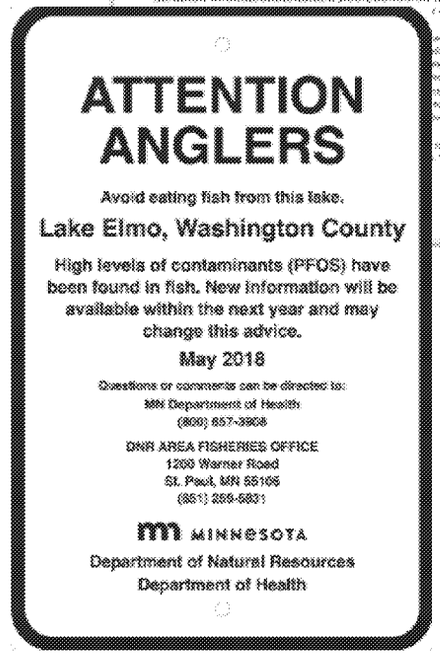
Water Treatment Using Carbon Filters (GAC)


ATTENTION ANGLERS

Avoid eating fish from this lake.

Lake Elmo, Washington County

High levels of contaminants (PFOS) have been found in fish. New information will be available within the next year and may change this advice.

May 2018

Questions or comments can be directed to:
MN Department of Health
(800) 657-3908

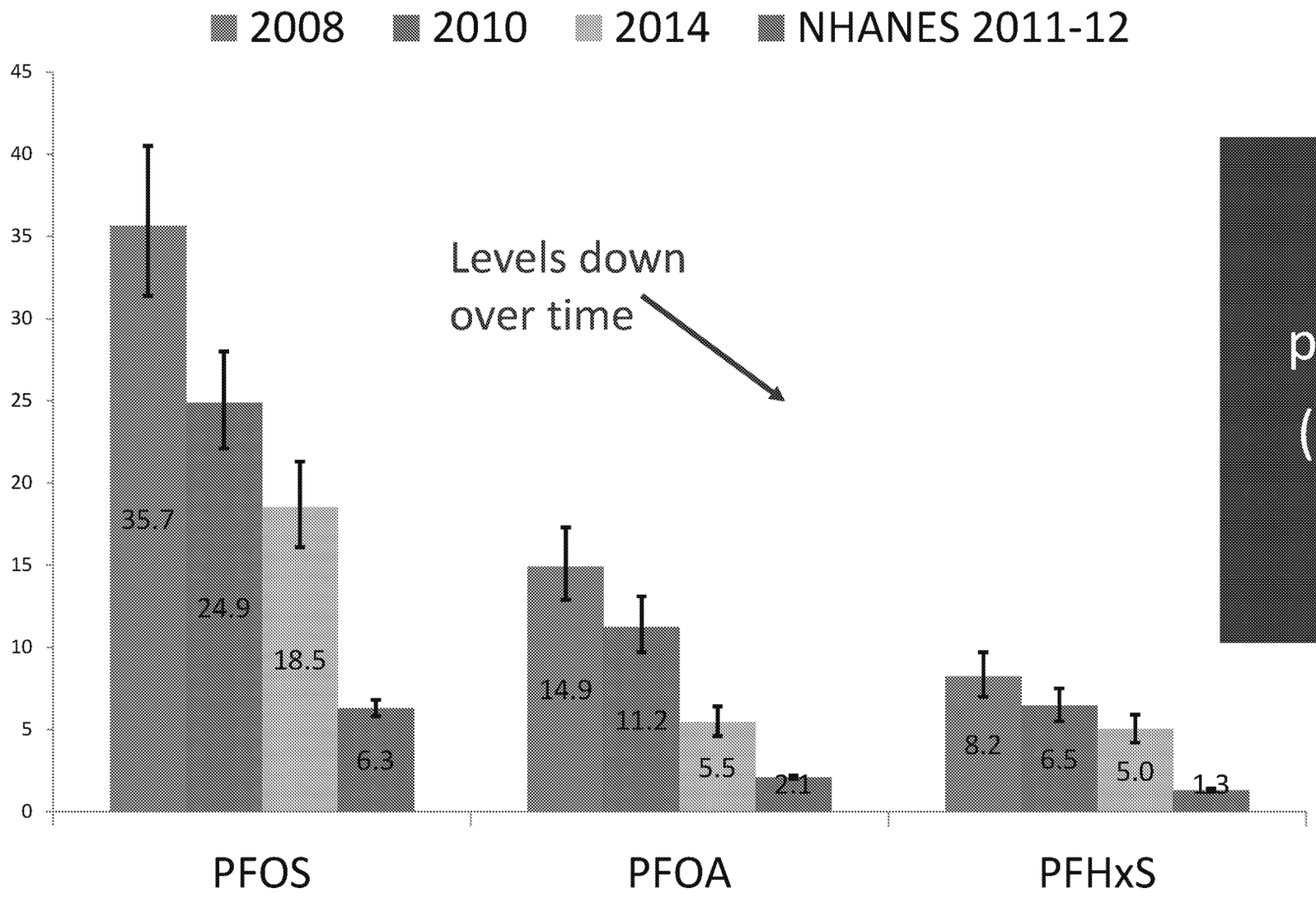
DNR AREA FISHERIES OFFICE
1200 Warner Road
St. Paul, MN 55106
(651) 259-5831

MINNESOTA
Department of Natural Resources
Department of Health

Other PFAS Activities

- PFAS in Homes and Gardens study (2010)
  - Tested water, soil, produce and dust at 20 homes with PFAS in water
  - PFBA found in 98% of produce
  - No health risks of concern when considering all exposures
- Biomonitoring
  - Measured blood levels of 8 PFAS chemicals in two groups of East Metro residents
  - Levels were highest in those who lived longest in the area before treatment was installed

Biomonitoring During Response

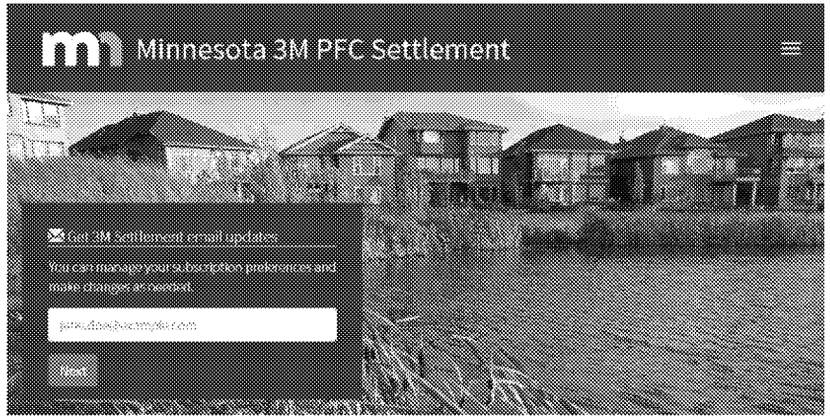


PFAS decreased in blood of people drinking treated water

(average concentrations still above national averages)

2018 Minnesota 3M PFC Settlement

- $850 million grant to the state
- Trustees: Minnesota Pollution Control Agency and Minnesota Department of Natural Resources
- $720 million to provide long-term solutions for:
  - Clean and sustainable drinking water
  - Restoration and enhancement of natural resources
- Expectations for community participation
- Preserves 3M's obligations under the 2007 consent order



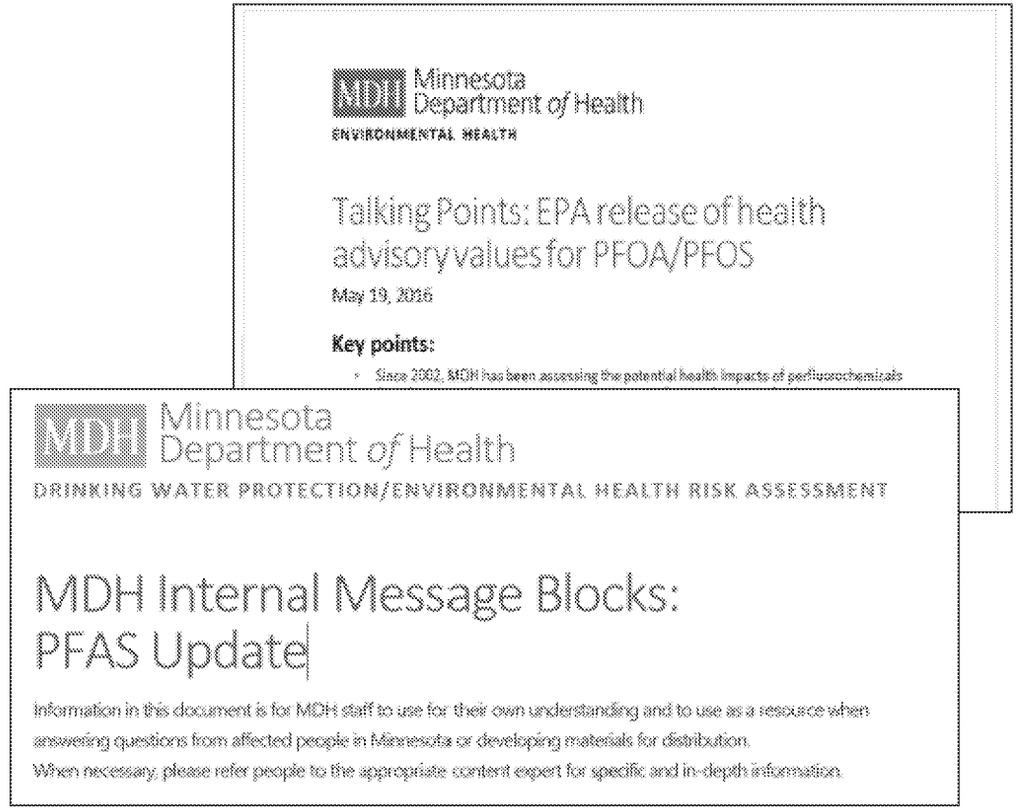
More information can be found at *https://3msettlement.state.mn.us*

Lessons Learned

- Lack of federal maximum contaminant limit (MCL) means state has to decide how to act and regulate
- Collaboration is important
  - Different parties may have different priorities
- Politics can quickly change a timeline

Lessons Learned

- Communication is key
  - Must include the public, regulators, regulated parties, and elected officials
  - Not an emergency; PFAS health effects are based on a lifetime of exposure
  - State government regulators must give cities time to prepare a response
  - Unique risk communication challenges



MDH Minnesota Department of Health
ENVIRONMENTAL HEALTH

Talking Points: EPA release of health advisory values for PFOA/PFOS

May 19, 2016

Key points:

- Since 2002, MDH has been assessing the potential health impacts of perfluorochemicals

MDH Minnesota Department of Health
DRINKING WATER PROTECTION/ENVIRONMENTAL HEALTH RISK ASSESSMENT

MDH Internal Message Blocks:
PFAS Update

Information in this document is for MDH staff to use for their own understanding and to use as a resource when answering questions from affected people in Minnesota or developing materials for distribution.
When necessary, please refer people to the appropriate content expert for specific and in-depth information.

Going Forward

- Will continue to see changing health-based guidance values
- Will see broader analytical methods
  - Will be able to detect more PFAS chemicals (e.g. GenX)
- How to spend $720 million
  - Open houses and working groups to identify potential projects
  - Politicians and local municipalities may have “pet projects” they would like included – open checkbook mentality


MINNESOTA
Safe drinking water for everyone, everywhere in Minnesota

DEPARTMENT OF HEALTH

Questions?

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651-201-4660